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Case Docket No. 4326 US

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Deposited August 22, 2000

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08/22/00

THE COMMISSIONER OF PATENTS AND TRADEMARKS

Washington, D.C. 20231

Sir:

This a request for an application under 37 CFR 1.53(b) and (f)

Transmitted herewith for filing is the patent application of

Inventor(s) Reinhold Berberich

For: SECURITY DEVICE

Enclosed are:

- [X] 7 pages, abstract, specification, and claims; unsigned declaration  
(1 page)
- [X] 1 soft 8.5"x11" size sheet of drawing (Figs. 1-2) attached to  
application
- [X] Filing without fee or Declaration under 37 CFR 1.53(f)
- [X] Express Mail mailing label no. on all filed papers
- [ ] certified copies of a German Patent Application
- [X] Preliminary Amendment (PLEASE ENTER BEFORE CALCULATING CLAIM FEES)
- [ ] Information Disclosure Statement,

Claims as Filed

	NUMBER FILED	NUMBER EXTRA	RATE	BASIC FEE \$690.00
TOTAL CLAIMS	7 -20=	0	\$18	0
INDEPENDENT CLAIMS	1 -3=	0	\$78	0
Surcharge fee for filing under 1.53(f)				<u>\$130.00</u>
				<u>\$820.00</u>

- [X] CLAIM IS HEREBY MADE OF THE BENEFIT OF THE FILING DATE OF THE  
German Patent Application 199 41 346.0 filed August 31, 1999  
UNDER 35 USC 119.

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4326 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Express Mail mailing Label No. EJ450234239US  
Deposited August 22, 2000

USA Patent Application  
Reinhold Berberich  
SECURITY DEVICE

Priority: German Patent Application  
199 41 346.0 filed August 31, 1999

Hon. Commissioner of Patents and Trademarks  
Washington, D.C. 20231

S I R :  
PRELIMINARY AMENDMENT

Please amend this application simultaneously with filing as  
follows:

IN THE ABSTRACT

(UNNUMBERED PAGE 7)

Line 3, delete "has means for"

Line 4, change "transmitting" to --transmits--

Line 6, change "has means for receiving" to --receives--

Line 7, change "for transmitting" to --transmits--

Line 11, change "have means for altering" to --can alter--

IN THE SPECIFICATION

PAGE 1

Line 5, delete "Description"

Line 9, before this line, after the title, insert:

--FIELD AND BACKGROUND OF THE INVENTION--

Line 32, before this line insert:

--SUMMARY OF THE INVENTION--

Line 33, change "specify" to --provide--

Lines 37, delete "by virtue of"

Line 38, change "the feature that" to --wherein--

PAGE 3

Line 27, before this line insert:

--BRIEF DESCRIPTION OF THE DRAWING--

Line 30, after "figures" insert --of the drawing--

Line 32, change the comma "," to a semicolon ---;--

Line 38, before this line insert:

--DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT--

IN THE CLAIMS

(APPLICATION PAGES 5-6)

Before claim 1, change "Patent Claims" to --I CLAIM:--

Please amend claims 1-7 as follows:

1. (amended) A device for actuating a security device, preferably for securing a motor vehicle against unauthorized use, [in which] comprising a control unit [has] having means for transmitting a first coded electromagnetic signal (stimulus signal), [in which] a portable transmitter (radio key), [has] having means for receiving the stimulus signal and for transmitting a second coded electromagnetic signal (enable signal), and [in which] wherein the control unit is connected to the security device and actuates the latter if the enable signal is received and recognized, wherein both the control unit and the radio key have means for altering [the] carrier frequency of the coded electromagnetic signals and wherein they alter [this] said frequency during signal transmission in a manner [which is] known only to the control unit and to the radio key.

2. (amended) The device as claimed in claim 1, wherein the radio key has a narrowband transmitter, [whose] transmission frequency of which is controllable [can be

controlled] and wherein the radio key alters its transmission frequency over intervals of time when transmitting signals.

3. (amended) The device as claimed in claim 2, wherein [the] said control unit has a tunable narrowband receiver having the same frequency range as the transmitter in the radio key.

4. (amended) The device as claimed in claim 1 [one of the preceding claims], wherein [the] manner in which the carrier frequency is to be changed is contained in the stimulus signal (1) as a coded information item for transmission to the radio key.

5. (amended) The device as claimed in claim 4, wherein the stimulus signal (1) contains a random number and the carrier frequencies are determined by applying a cryptoalgorithm (3) to [this] said stimulus signal (1) and, in this context, particularly to the random number contained in the stimulus signal (1).

6. (amended) The device as claimed in claim 4, wherein [the] selection of the carrier frequency [selection] at the receiver and transmitter ends is determined, using [the] a coded information item in the stimulus signal, by

means of a cryptographic method in the radio key and in the control unit independently of one another.

7. (amended) The device as claimed in claim 1 [one of the preceding claims], wherein the signal transmission takes place over a spectrum of different carrier frequencies and wherein the enable signal contains a coded information item for modulating [this] said spectrum.

R E M A R K S

This amendment is being made simultaneously with filing this application. The abstract, specification and claims have been amended in accordance with USA practice under 35 USC 112 and to eliminate multiple-dependent form claims. No multiple-dependent claims exist as of the filing date.

No multiple-dependent form claims exist in this application.

Please enter this Preliminary Amendment prior to calculating the claim filing fee and prior to an action on the merits, which is respectfully requested.

Respectfully submitted,

Reinhold Berberich

By:

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**Description**

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**Security device**

The invention relates to a device for actuating  
10 a security device, preferably for securing a motor vehicle against unauthorized use, in which a control unit has means for transmitting a first coded electromagnetic signal (stimulus signal), in which a portable transmitter (radio key) has means for receiving the stimulus signal and for transmitting a second coded signal (enable signal), and in which the control unit is connected to the security device and actuates the latter if the enable signal is received and recognized.

20 Such radio keys are used today for unlocking the doors of motor vehicles without contact, for example. They are known from WO 92/18732, for example.

If the steady-state transmission and reception frequencies for such conventional systems are known, 25 relatively simple transceivers can also forward the stimulus signal over relatively long distances from the vehicle to the authorized user and hence stimulate a key. If appropriate transmitters and receivers are also used for transmitting back the response signal, the 30 response signal can also be traced back to the vehicle and used for unauthorized access to the vehicle.

The object of the present invention is to specify a device for conveniently and contactlessly actuating security devices, in particular the central locking system and immobilizer in motor vehicles, which makes such unauthorized access virtually impossible.

The invention achieves this object by virtue of the feature that both the control unit and the radio key have means for altering the carrier frequency of

the coded electromagnetic signals and that they alter this frequency during signal transmission in a manner which is known only to the control unit and to the radio key. On account of the only very short total  
5 transmission time, changing the carrier frequency makes it virtually impossible to monitor the signals and misuse them for unauthorized opening of the security device.

In a first refinement of the invention, the  
10 radio key has a narrowband transmitter whose transmission frequency can be controlled, and the radio key alters its transmission frequency over intervals of time when transmitting signals. In addition, the control unit has a tunable narrowband receiver having  
15 the same frequency range as the transmitter in the radio key.

In a further refinement of the invention, the manner in which the carrier frequency is to be changed is contained in the stimulus signal as a coded  
20 information item for transmission to the radio key.

In this context, provision may be made for the stimulus signal to contain a random number and for the carrier frequencies to be determined by applying a cryptoalgorithm to this stimulus signal and, in this  
25 context, particularly to the random number contained in the stimulus signal.

In order to ensure that both the radio key and the control unit change over rapidly to the next carrier frequency in each case, a next refinement of  
30 the invention provides for the carrier frequency selection at the receiver and transmitter ends to be determined, using the coded information item in the stimulus signal, by means of a cryptographic method in the radio key and in the control unit independently of  
35 one another. Since the necessary information item is produced at both ends in parallel, there is no need for this information item to be transmitted between the control unit and the radio key.

As a basis for generating the separate carrier frequencies for this frequency hopping, the same cryptoalgorithm can be used as for normal message authentication. In this context, the authentication component of the enable signal is at the same time the basis for selection of the discrete carrier frequencies. This has the advantage that no additional computation time need be taken up for generating this data.

In a further refinement of the invention, the signal transmission takes place over a spectrum of different carrier frequencies and the enable signal contains a coded information item for modulating this spectrum. The use of this spread spectrum transmission likewise makes signal transmission very secure.

In this context, the authentication component (for example) of the enable signal can be used as a basis for producing the spread spectrum modulation sequence. In this case, all advantages in terms of computation time taken up etc. are retained. The fact that the present and further spectral distribution of the transmitted signal is known at the transmission and reception ends means that, additionally, the otherwise necessary synchronization or locking on between the transmitter and the receiver is eliminated in the spread spectrum method.

Illustrative embodiments of the invention are shown in the drawing with the aid of a plurality of figures and are explained in more detail in the description below. In the figures:

Figure 1 shows a schematic diagram for deriving transmission channels from a stimulus signal, and

Figure 2 shows graphs of the resultant transmission spectra.

In the figures, identical parts are provided with identical reference symbols.

Figure 1 shows how a radio key uses the stimulus signal 1 (challenge signal) transmitted by the

control unit to determine the sequence of transmission channels n which are to be used and are known at both ends for transmitting signals.

To this end, the stimulus signal 1 is loaded  
5 into a ring buffer and is passed through a cryptoalgorithm 3 in steps. The cryptoalgorithm 3 forwards the data stream, comprising bits, in the stimulus signal 1 after a particular volume of data or after a particular time t and thus generates as the  
10 result the transmission channel which is to be used for the next transmission sequence. The same procedure also takes place in parallel in the control unit, but in this unit the next reception channels in each case are determined as the result.

15 The rapid, narrowband changeover cycle, which cannot be anticipated by outsiders, for the carrier frequency makes it impossible to use a single relay radio link to gain unauthorized access to a vehicle.

20 Figure 2 shows the resultant transmission spectra (A=amplitude) for the radio key when its enable signal is transmitted. Whenever a particular time t or a particular number of data bits has passed, there is a changeover to another channel on the basis of the previously determined sequence. The control unit  
25 likewise changes over its reception device synchronously, so that rapid data transmission is assured.

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**Patent Claims**

1. A device for actuating a security device, preferably for securing a motor vehicle against unauthorized use, in which a control unit has means for transmitting a first coded electromagnetic signal (stimulus signal), in which a portable transmitter (radio key) has means for receiving the stimulus signal and for transmitting a second coded signal (enable signal), and in which the control unit is connected to the security device and actuates the latter if the enable signal is received and recognized, wherein both the control unit and the radio key have means for altering the carrier frequency of the coded electromagnetic signals and wherein they alter this frequency during signal transmission in a manner which is known only to the control unit and to the radio key.
2. The device as claimed in claim 1, wherein the radio key has a narrowband transmitter whose transmission frequency can be controlled and wherein the radio key alters its transmission frequency over intervals of time when transmitting signals.
3. The device as claimed in claim 2, wherein the control unit has a tunable narrowband receiver having the same frequency range as the transmitter in the radio key.
4. The device as claimed in one of the preceding claims, wherein the manner in which the carrier frequency is to be changed is contained in the stimulus signal (1) as a coded information item for transmission to the radio key.
5. The device as claimed in claim 4, wherein the stimulus signal (1) contains a random number and the carrier frequencies are determined by applying a cryptoalgorithm (3) to this stimulus signal (1) and, in

this context, particularly to the random number contained in the stimulus signal (1).

6. The device as claimed in claim 4, wherein the carrier frequency selection at the receiver and  
5 transmitter ends is determined, using the coded information item in the stimulus signal, by means of a cryptographic method in the radio key and in the control unit independently of one another.

7. The device as claimed in one of the preceding  
10 claims, wherein the signal transmission takes place over a spectrum of different carrier frequencies and wherein the enable signal contains a coded information item for modulating this spectrum.

EPO Patent Application

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**Abstract**

In a device for actuating a security device, preferably for securing a motor vehicle against unauthorized use, in which a control unit has means for transmitting a first coded electromagnetic signal (stimulus signal), in which a portable transmitter (radio key) has means for receiving the stimulus signal and for transmitting a second coded signal (enable signal), and in which the control unit is connected to the security device and actuates the latter if the enable signal is received and recognized, both the control unit and the radio key have means for altering the carrier frequency of the coded electromagnetic signals. During signal transmission, this frequency is altered in a manner which is known only to the control unit and to the radio key.

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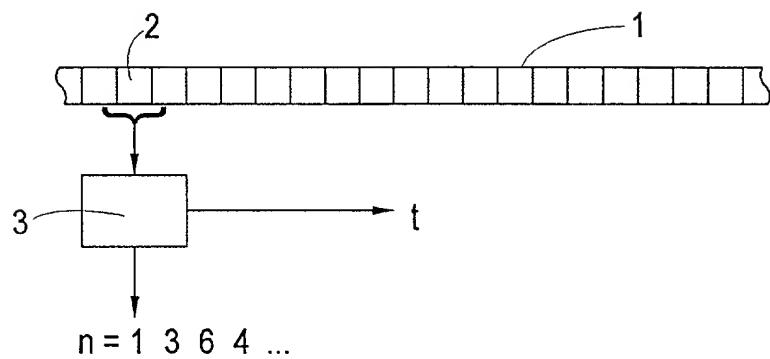


Fig. 1

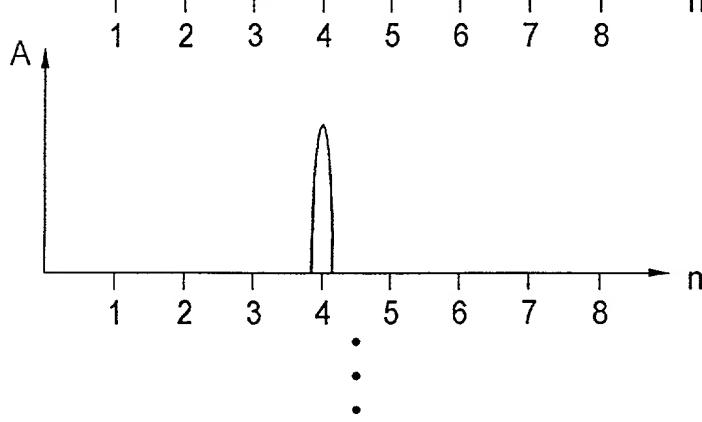
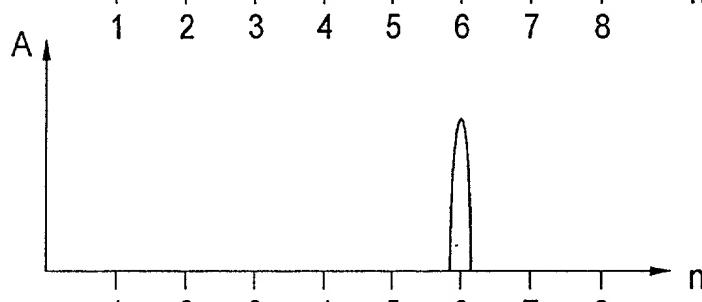
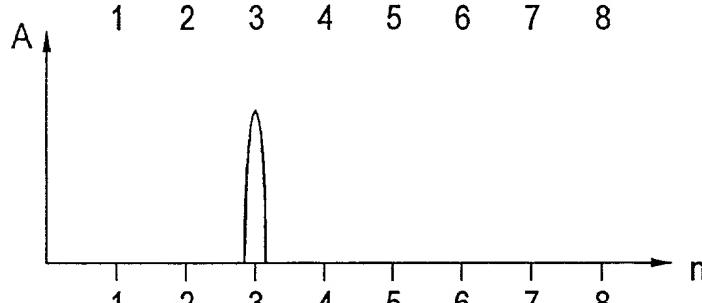
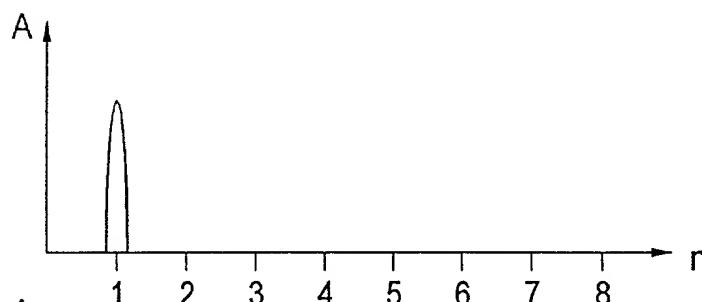


Fig. 2

## DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled  
SECURITY DEVICE

Docket Number (Optional)  
4326 US

S. 09/04/390  
D. 09/22/00  
P. 09/22/00

is attached hereto unless the following box is checked:

was filed on \_\_\_\_\_ as United States Application Number or PCT International Application Number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

## Prior Foreign Application(s)

	(Number)	Germany (Country)	31/08/1999 (Day/Month/Year Filed)	Priority Claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)
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(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)
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I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

<input type="checkbox"/>	Martin A. Farber, Esq. Reg. No. 22,345
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor (given name, family name) Reinhold Berberich

Inventor's signature \_\_\_\_\_ Date \_\_\_\_\_

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Second Inventor's signature \_\_\_\_\_ Date \_\_\_\_\_

Residence \_\_\_\_\_ Citizenship \_\_\_\_\_

Post Office Address \_\_\_\_\_

Additional inventors are being named on a separate sheet attached hereto.